

# Supernova Surveys with DRM 1

Estimates by C. Baltay

## DRM 1 compared to IDRM

- Main differences as far as Supernovae are concerned:
  - Larger area Imager
  - Longer wavelength limit (2.5 microns vs 2.0)
  - DRM 1 has same dia mirror (1.3 m), DRM 1a has 1.2 m mirror

# Design Reference Mission Comparisons

Feature	IDRM	DRM 1	DRM 1a	DRM 1	DRM 1a
Mirror Dia	1.3 m	1.3 m	1.2 m		
Launch	ATLAS V	ATLAS V	Falcon 9		
Mission Life	5 yrs	5 yrs	5 yrs		
Imager					
Detectors	28 H2RG	36 H2RG	15 H4RG		
Plate Scale	0.18 "/pixl	0.18 "/pixl	0.17 "/pixl		
Area	0.28 sq deg	0.36 sq deg	0.56 sq deg		
A(det)xA(Te)	0.37	0.48	0.63		
SNe Spectro	slitless	slitless	slitless		
Lambda Max	2.0 microns	2.5 microns	2.5 microns		
SNe Survey					
Duration	6 months	6 months	6 months		
Z max	1.2	1.2	1.2	1.3	1.4
Tiers	2	2	2		
No of SNE	1194	1549	2033	1200	1200
FoM	134	160	191		

## Effect of Extended Wavelength Range

- Use intrinsic supernova spread as we agreed:
  - Rest frame B band 16 %
  - Rest frame Z band 15 %
  - Rest frame J band 13 %
  - Rest frame H band 12 %
- For the reddest (1.6 to 2.0 $\mu$ ) band, this wavelength dependence translates into a z dependence, so for the calculations we use the fit  $\sigma_{\text{intrinsic}} = 0.11 + 0.033 z$
- With the extended wavelength range, could take the reddest filter to be 2.0 to 2.5 $\mu$ . For a supernova with a given z this would correspond to a redder band in the restframe, reducing the intrinsic spread by about 10%.
- This would lead to an improved Figure of Merit, OR would allow the survey to go to higher z max.